ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of:	)	
	)	
Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use	)	ET Docket No. 94-32
	)	
	)	

COMMENTS OF MOTOROLA, INC.

Motorola Inc. ("Motorola") hereby submits its comments on the Notice of Proposed Rulemaking ("Notice") in the above-captioned proceeding.[1] The Notice solicits comments on proposals to reallocate 50 MHz of spectrum from federal to non-federal use. Motorola supports the Commission's goal of assuring that this "spectrum is put to its best and most valued use and that the greatest benefit to the public is attained."[2] It differs with the approach set forth in the Notice in several respects, however. First, Motorola believes the Notice ignores the critical need to allocate additional spectrum for private users, particularly the advanced private land mobile applications discussed in the COPE Petition. Second, Motorola is concerned that the Notice would jeopardize continued investment in the 2.4 GHz band by innovative Part 15 spread spectrum devices, which produce substantial public benefits. Third, the proposal to use auctions to allocate spectrum for generic services would contravene the Commission's competitive bidding authority and impermissibly substitute the marketplace for the Commission's independent obligation to make allocations that advance

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[1] FCC 94-272 (released Nov. 8, 1994).

[2] Id. at ¶ 8.

the public interests. Accordingly, to achieve the fundamental goal of this proceeding, the Commission should allocate the 2390-2400 MHz band and the soon-to-be-available 2300-2310 MHz band for private land mobile use on a paired basis, and should promote continued use of the 2.4 GHz band by Part 15 devices.

I. THE COMMISSION'S PROPOSAL IGNORES THE CRITICAL NEED FOR NEW PRIVATE RADIO SPECTRUM

On December 23, 1993, the Coalition of Private Users of Emerging Multimedia Technologies ("COPE") requested that the Commission allocate spectrum to meet the needs of specialized private land mobile radio users for advanced wireless imaging and decision processing/remote file access systems. The COPE Petition convincingly demonstrated that such uses of the spectrum will produce tremendous public benefits, but that this high priority need threatens to remain unmet absent a specific and substantial allocation by the Commission. COPE also noted that such an allocation would advance Congress' directive that the Commission must consider the spectrum needs of the public safety community and other private users when making spectrum allocation decisions.[3] The technology is available to meet these needs, but the lack of spectrum is now an inhibitor to actual product development.

Far from accommodating this critical need, the Notice suggests, without analysis, that "private users can receive service from commercial service providers and can compete in

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[3] Budget Act, § 112. Notably, the Commission acknowledged its duties in the Notice of Inquiry stage of this proceeding. NOI at ¶ 9(f).

obtaining spectrum on the same basis as commercial providers."[4] This cavalier response to the problems faced by private users simply fails to acknowledge the unique operational needs of most private spectrum users.

As an initial matter, the suggestion that private users can use commercially provided service to meet their spectrum needs is without merit. The specialized needs of most private users cannot be met by commercial carriers. In order to operate effectively during critical periods, for example, public safety users need faster communication systems response times than what is offered by commercial radio providers. Put simply, public safety agencies may not have the time to wait for a "dial tone". The time required to set up a typical cellular call may of little consequence to the general public but could have disastrous consequences for police officers. Likewise, the risk that circuits will be jammed during emergencies reduces the reliability of public safety communications at the precise time when reliability is most critical. Only by operating and controlling their own communications systems can public safety organizations ensure that they have sufficient capacity to handle not only their normal day-to-day communications needs, but also major emergencies.

The contribution to society by entities such as police and fire fighters is well understood and acknowledged but other private land mobile user groups also assist in the protection of life and property and have highly specialized needs for reliability and capacity. For example, in the case of disasters such as oil spills or train wrecks, the petroleum company or the railroad personnel are often the first respondents to the emergency and use private land mobile radio to pinpoint the disaster and coordinate with professional public

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[4] Notice at ¶ 16.

safety managers to minimize loss of life and property. Also, private land mobile radio is used to support control systems for the nation's public utilities and help prevent, or minimize the duration of, unacceptable disruptions of service to consumers. The use of private radio systems for such specialized applications, which help improve the efficiency and competitiveness of all American businesses, should not be held hostage by a desire to obtain competitive bidding revenues.

In addition to their unique capacity needs, many private users require heightened levels of interference avoidance and reliability protection. While occasional system outages and signal interferences may be mildly inconvenient for the average commercial customer, they are devastating to police, fire and industrial operations where uninterrupted communications capabilities are critical. Such operations must routinely communicate in basements, garages, and highly remote areas where commercial systems may not provide adequate coverage.[5] Moreover, private radio users often require higher levels of security than is available from commercial systems. For example, the ability to employ sophisticated encryption technology over private systems is critical to the utilization of many law enforcement communication services. Similarly, other private users need control of their systems to implement specialized features and operational practices needed to support the mission at hand. For example, the dispatcher of a city's private trunked system can dynamically reconfigure certain users into different "talk groups" as the need arises to

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[5] Also, private land mobile users often must operate in extreme environmental conditions such as high heat, severe cold, or even underwater. Commercially available equipment through carrier-based systems is often inadequate for these specialized applications.

respond to a given emergency. Without control of the system, this operational requirement could be lost.

Furthermore, many of the emerging multimedia services discussed in the COPE Petition require greater bandwidth than is available in existing private allocations or likely to be made available by commercial service providers. In the near future, law enforcement officials will have access to a host of high speed data applications, including the ability to transmit and receive fingerprints, mug shots, maps, and floor layouts.[6] Similar developments will be implemented in the areas of energy conservation and management, emergency response and rescue, health care, and pollution control.

Finally, it is inconceivable that many private users could compete successfully against commercial carriers in the bidding process.[7] By definition, commercial providers operate their services for profit. These services are subscriber-based; they thus have access to a significant expected revenue stream. In sharp contrast, many private users operate communications services to support activities such as law enforcement, fire prevention, and medical services. Because the entities deploying these services -- primarily state and local governments -- have limited budgets and do not generate revenues, private users have few resources with which to bid for spectrum. As a result, the auction process is not a viable mechanism for private users to obtain spectrum. Nonetheless, these users provide great

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[6] COPE Petition at 12-14.

[7] Significantly, in establishing the auction framework, Congress recognized the inability of non-commercial providers to compete against subscriber-based providers. Section 309(j) of the Act specifies that the Commission may use competitive bidding only when "the principal use of [the] spectrum will involve, or is reasonably likely to involve, the licensee receiving compensation from subscribers." 47 U.S.C. 309(j)(2).

benefits to the public. For example, according to the FCC's recently released Notice of Proposed Rule Making on emergency calling systems, the Commission estimated that approximately 260,000 calls nationwide are placed to 911 dispatchers every day.[8] Without adequate spectrum for effective wireless communications, police, fire and emergency medical personnel will be unable to provide the level of response to such requests that the public demands and deserves.

Until the Commission specifically identifies additional spectrum for private mobile radio use, these critical needs will go unmet. The spectrum that is available for private land mobile communications is already extremely congested, and private users are experiencing severe spectrum shortages in many areas of the country. Although "refarming" the existing frequency bands may help reduce congestion to some degree, it will not accommodate the need for emerging multimedia services as documented in the COPE Petition. Clearly, an additional allocation of private radio spectrum is plainly in the public interest.

II. IN LIEU OF THE GENERAL ALLOCATION PROPOSAL, THE FCC SHOULD ALLOCATE THE 2390-2400 MHZ AND THE 2300-2310 MHZ BANDS FOR PRIVATE LAND MOBILE USE

During the Inquiry phase of this proceeding, Motorola stated that additional spectrum for advanced private land mobile communications as articulated by the COPE Petition ranks as one of the highest priorities to be met by the government spectrum reallocation. The need for additional private land mobile spectrum is long overdue. Unfortunately, the bands proposed for immediate reallocation by the NTIA are not without limitations in their utility

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[8] Notice of Proposed Rule Making, CC Docket No. 94-102, released October 19, 1994, (¶3).

for wide-area mobile communications. In its earlier comments, for example, Motorola expressed some concern that the 2390-2400 MHz band suffers from excessive noise levels due to its close proximity to the 2450 MHz ISM band and thus concluded that mobile devices operating in this band could suffer a cost penalty.

The noise splatter from the adjacent 2.4 GHz ISM band caused primarily by microwave ovens, high efficiency lighting devices, and industrial heaters -- could increase the noise floor in the 2390-2400 MHz band by 6 dB or more. Motorola estimates that this noise would result in a reduction of geographic range of a wide area wireless system by a factor of 1.41 (or a reduction in area by a factor of 2). Therefore, this environment would necessitate a second base station site to recover that coverage area for wide area mobile systems.[9]

From a pure spectrum engineering standpoint, other bands that are the subject of the NTIA transfer could be preferable for private systems. The 380-400 MHz and the 1710-1760 MHz bands are cases in point. Unfortunately, these bands have regulatory limitations that may hamper their timely availability for private land mobile users.

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[9] If this band were to be used for the base station receive portion of a duplex communications system, that second base site would consist of a remote receiver, transmission line, antenna, and ancillary parts. The output from that receiver would be transmitted back to the original base site for processing. Thus, the splatter noise in the 2390-2400 MHz band will raise the cost of the receiving portion of a wide area mobile infrastructure by a factor of two.

Clearly, the 380-400 MHz band that the FCC noted in its recent report to the NTIA[10] could support wide area mobile systems with lower infrastructure costs. Further, that band is relatively close to the existing 450-470 MHz non-government and 406-420 MHz government land mobile bands. This would enhance interoperability possibilities with existing systems. Also, in Europe, segments of this band are being identified for civilian public safety land mobile use to support new digital trunked systems. Unfortunately, at this time it is not clear what resolutions will emerge from the FCC/NTIA/DOD discussions concerning the availability of this band within the U.S. Until such determinations are made, it would be irresponsible to relinquish consideration of bands such as 2300-2310/2390-2400 MHz for such a high priority unmet spectrum requirement as that needed to support public safety, public service, and industrial communications services.

Similarly, the 1710-1760 MHz band has attractive aspects for wide area mobile use. First, it is 50 MHz of available spectrum as opposed to 20 MHz. Given the COPE Petition's justification of 75 MHz of spectrum for emerging private systems and technologies, an allocation of only 20 MHz clearly is not a total solution. Second the proximity of the 1710-1760 MHz band to the PCS bands would provide some benefits in economies of scale for basic communications research and technology developments. While customized features, systems capabilities and system implementation would be distinct for private users, some commonality in the underlying technology and semiconductor development would help reduce equipment costs.

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[10] Report from the Federal Communications Commission to Ronald H. Brown Secretary, U.S. Department of Commerce Regarding the Preliminary Spectrum Reallocation Report, FCC 94-213, released August 9, 1994, (FCC Report).

Unfortunately, the ability to access the 1710-1760 MHz band in a reasonable time frame appears to be far from certain. The Preliminary NTIA Report recommended access, even on a shared government/non-government basis, be withheld for another ten years. Motorola is pleased that the FCC recommended that this time frame be compressed,[11] but even then access would not occur for another five years. The public safety community cannot wait five years to start the process of implementing a national infrastructure of new technology to help fight crime. Also, clearing this band could pose difficulties as such public safety entities have limited funds for relocation. Moreover, the underlying legislation passed by Congress specifically protects certain incumbent users in the band which could complicate redevelopment of this spectrum for private mobile systems. If, however, some of the constraints could be addressed, the 1710-1760 MHz band would be viable as a spectrum home for new private emerging technology systems.

Therefore, notwithstanding the fact that the noise contained in the 2390-2400 MHz band will extract some costs in terms of additional infrastructure, Motorola recommends that the Commission pair this band with the 2300-2310 MHz band and allocate it for advanced private land mobile communications. This action will provide a portion of the relief for critical public safety and other advanced private land mobile needs sought by the COPE Petition. Further, given the fact that the two bands are lightly populated by existing government operations, these legitimate needs can be satisfied without extensive relocation costs being incurred. However, additional bands obviously will be required to satisfy COPE's demonstrated need for 75 MHz of new allocations.

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[11] FCC Report at p. 27.

Although Motorola was initially skeptical of the utility of the 2390-2400 MHz band for wide area services, the probable immediate availability of the 2300-2310 MHz will ensure that frequency division duplex ("FDD") technology can be developed to help overcome this limitation. As such, it is imperative that the FCC continue its encouragement that the NTIA accelerate its withdrawal from this band.[12] Furthermore, while paired spectrum use will allow for the development of more robust systems, Motorola recommends that the FCC also explore the possibility of limiting ISM emissions straying into the 2390-2400 MHz band to more stringent levels.

Motorola is confident that cost-efficient mobile/portable technology can be made available in the near future consistent with the timing of the proposed availability of the spectrum. For these reasons, Motorola recommends that the FCC allocate the 2300-2310 MHz and 2390-2400 MHz bands for private land mobile use.

III. SPREAD SPECTRUM PART 15 OPERATIONS ARE THE BEST USE OF THE 2402-2417 MHZ BAND

In its report to the NTIA concerning the preliminary reallocation plan, the Commission correctly reasoned that:

> installing a licensed service in this band [2402-2417 MHz] may result in a loss to the public of Part 15 spread spectrum communications equipment as well as possibly preventing use of this band for Amateur service operations. The

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[12] Under the NTIA's preliminary reallocation proposal, the 2300-2310 MHz band would have been made available for non-government use by January of 1996. The FCC has recommended that the NTIA reconsider that proposal so that this band could instead be made available immediately for private sector use. FCC Report at p. 31.

> benefits of providing short-range communications via unlicensed low power devices is generally recognized, and interest in such devices is growing.[13]

In summary, the FCC concluded that:

> we believe that the reallocation of this band will provide very little additional value to the public. Any future changes to this band could jeopardize significant private sector investments already made in this band and could result in a loss of benefits to the public and the Federal Government.[14]

However, the Commission now proposes to instead allocate the 2402-2417 MHz band for "General Fixed and Mobile services" and to "make licenses available through competitive bidding."[15] In so doing, the Commission seeks comment on "retaining future use of this band by Part 15 equipment ... possibilities include eliminating this band from Part 15 use in order to avoid any potential conflicts with future licensed services. . ."[16]

Motorola believes that the NPRM's reversal from the Commission's previous position threatens to undermine the "best and most valued use" of the 2402-2417 MHz band; namely, a thriving and competitive Part 15 industry developing spread spectrum short-range communications systems. As referenced by the Commission, there has been significant investment and development of technology for Part 15 use of this band which is now at risk under the current proposal. For example the IEEE committee 802.11 has been meeting for several years to establish an industry standard for Part 15 wireless LAN units operating at 2.4 GHz. This industry standard setting committee includes some the best and brightest of

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[13] Id.

[14] Id. at 23.

[15] Notice at ¶9.

[16] Notice at ¶18.

this country's communications/computing companies -- Advanced Micro Devices, Aironet Wireless Communications, Inc., Apple Computer, Inc., AT&T Global Information Solutions, Digital Equipment Corp., GEC Plessey Semiconductors, Harris Corporation, IBM, and a host of others including Motorola. Loss of the 2402-2417 MHz band for Part 15 operations, or even a simple adjustment to the expected operating environment of the spectrum, would completely undue years of work in developing this standard.

The frequency hopping spread spectrum specification of the IEEE 802.11 committee's draft standard utilizes one megahertz wide channels as allowed by the FCC rules for spread spectrum operation in the 2400-2483.5 MHz band. As feared by many, the auctioning of the 2402-2417 MHz band to primary licensees would make this band segment unusable for spread spectrum devices. This concerns is not only because of the interference that the primary systems could cause to the unlicensed devices, but also because the new primary users might detect interference -- regardless of how slight -- from the spread spectrum operations and request that such devices cease operations. This threat would reduce the usable portion of the 2.4 GHz ISM band to less than 75 MHz for Part 15 spread spectrum devices which is the minimum necessary for those devices under the scope of the IEEE committee in order to comply with FCC rules. While the FCC could change its unlicensed spread spectrum rules, the initiative and momentum of the current 802.11 standards process, the draft of which is now out for ballot, would be seriously damaged and possibly terminated if the 2402-2417 MHz were lost to the competitive bidding process.

In addition, other administrations around the world have followed the U.S. lead in making the 2.4 GHz band available for short-range spread spectrum systems. For example, the European administrations have agreed on a recommendation for similar usage of the 2.4

GHz band. This recommendation has already been implemented by Austria, Belgium, Bulgaria, Denmark, Finland, Germany, Ireland, Liechtenstein, Norway, Switzerland, and Turkey. The recommendation is also under active consideration by Iceland, the Netherlands, Sweden, the United Kingdom, Croatia, France, Greece, Italy and Poland. Clearly, when joined with the U.S., this provides a significant market opportunity for short-range spread spectrum products in which American companies have lead the way in developing.

Rather than reducing the availability of the 2450 MHz band for Part 15 spread spectrum technology, the FCC should instead encourage and support the development of this band by this highly successful industry. Otherwise, the regulatory process could be directly responsible for causing irreparable harm to a competitive, high technology industry that, because of past FCC encouragement, is now creating new jobs across America.

In the on-going FCC proceeding relating to the use of the ISM band at 902-928 MHz,[17] the FCC is apparently considering ways of modifying the regulatory status of compliant Part 15 devices with respect to services maintaining a higher allocation priority.[18]

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[17] See In the Matter of Amendment of Part 90 of the Commission's Rules to Adopt Regulations For Automatic Vehicle Monitoring Systems. PR Docket No. 93-61, 8 FCC Rcd. 2502 (1993).

[18] Throughout Region 2, the 902-928 MHz band is primarily designated for ISM applications and any radio-communication service operating within this band must accept any harmful interference from ISM equipment. In the United States, the 902-928 MHz band is allocated on a primary basis for government radiolocation operations but allow government fixed and mobile services on a secondary basis. Also, footnote US218 to the Table of Allocations provides for automatic vehicle monitoring ("AVM") operations in the band segments 902-912 MHz and 918-923 MHz on a secondary basis to ISM equipment. Although each of these multiple services have primary status, the Part 15 industry has succeeded in developing technology to operate within this intensely used band largely due to the encouragement of the FCC in the form of flexible and permissive technical standards. The 2402-2417 MHz band is similar in its allocation structure except that there is no specific non-government allocations for AVM devices.

For example, Motorola understands that the Commission has considered a policy that would adopt a presumption that Part 15 devices operating under certain technical specifics would be *incapable* of causing interference to a service maintaining a higher allocation priority. This would prevent licensed operations with a higher priority from unilaterally forcing Part 15 devices off the air simply because of the licensed service lacks the ability to reject even low-power transmissions.

Motorola submits that, at the bare minimum, the Commission should take no action with respect to the 2402-2417 MHz band without similar consideration regarding the status of Part 15 devices to services of a higher allocations priority.[19] While Motorola would support a simple clarification that elevates the status of Part 15 devices in the 2.4 GHz band to co-primary, it would also support a "presumption against interference" as contemplated in the 902-928 MHz proceeding. In this regard, Motorola suggests that any device transmitting an average EIRP of 25 milliwatts or less measured in a 1 MHz bandwidth over a one second period be presumed to be incapable of causing interference to any service of higher priority. Devices operating at such an energy level, which complies with existing Part 15 Rules, would pose less interference potential than the consumer microwave ovens that populate this band.

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[19] Motorola notes that even if the FCC were to reject its tentative proposal to allocate this band for generic fixed and mobile services, there would still be need for such a policy with respect to existing allocated services in the 2.4 GHz band such as the Amateur Radio Service.

IV. THE PROPOSAL TO ALLOCATE SPECTRUM BY AUCTION APPEARS TO VIOLATE THE COMMISSION'S COMPETITIVE BIDDING AUTHORITY

The Commission proposes to designate the 2390-2400 MHz, 2402-2417 MHz and 4660-4685 MHz bands for land mobile and fixed use through a "broad and general" allocation.[20] Under this approach, the Commission would not specify particular uses for these frequency bands, but instead would rely on "market forces" -- as they reveal themselves through the competitive bidding process -- to determine how each individual one or two MHz piece of the spectrum will be used in each licensed service area. The sole limitation that the Commission proposes to place on frequency use is a mean field strength limit at service area borders.

Motorola respectfully submits that this approach is inconsistent with statutory limitations on the Commission's competitive bidding authority in several respects. As an initial matter, Section 309(j)(7)(A) of the Communications Act, explicitly forbids the Commission from using auction to make allocation decisions:

> In making a decision pursuant to Section 303(c) to assign a band of frequencies to a use for which licenses or permits will be issued pursuant to this subsection . . . the Commission may not base a finding of public interest, convenience and necessity on the expectation of Federal revenues from the use of a system of competitive bidding.

Congress clearly recognized that an auction process oriented solely toward revenue-producing uses of spectrum will fail to account for all publicly beneficial uses of spectrum. Indeed, many noncommercial uses of spectrum, such as those supporting police, fire and emergency services among others, do not generate revenue streams, but nonetheless generate significant

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[20] Notice at ¶ 8.

public benefits. By failing to make an independent assessment of the public interest, the Commission would not only contravene the Communications Act, but also deprive the public of important noncommercial communications services.

Second, the proposal impermissibly delegates the Commission's stewardship over the use of spectrum to the marketplace. Section 309(j) states that "[n]othing . . . in the use of competitive bidding shall . . . alter spectrum allocation criteria and procedures established by the other provisions of this Act."[21] Section 303(c), in turn, directs that "the Commission . . . shall . . . [a]ssign bands of frequencies to the various classes of stations . . . "[22] The Commission itself has recognized that its authority to use competitive bidding is "limited to awarding licenses and is not to be used for allocating spectrum."[23] Nonetheless, the proposal to give winning bidders virtually unlimited flexibility to determine what type of services to provide violates Congress' clear indication that the Commission -- and not individual bidders -- should determine how frequencies are allocated among competing services.

Third, Section 309(j) also provides that the Commission's competitive bidding authority should:

> not be construed to relieve the Commission of the obligation in the public interest to continue to use engineering solutions, negotiation, threshold qualifications, service regulations, and other means in order to avoid mutual exclusivity in application and licensing proceedings.[24]

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[21] 47 U.S.C. 309(j)(6)(A).

[22] Id. § 303(c)(emphasis added).

[23] Notice at ¶ 9, n.24.

[24] 47 U.S.C. 309(j)(6)(E).

By allocating spectrum for general use, however, the Commission cannot help but fail to fulfill its statutory obligations. Mutual exclusivity can be avoided through methods such as frequency coordination and the creation of specific threshold qualifications. These methods are more easily implemented in the context of specific service allocations but are almost irrelevant under the proposed degree of flexibility. As a result, the Commission's "broad and general" allocation will ultimately promote mutual exclusivity, in direct contravention of the regulatory framework established by Congress.

V. CONCLUSION

Motorola believes that the Commission's NPRM fails to address the highly critical needs of the private land mobile community, including the public safety services, for additional spectrum. To decide that such users could either pay the market rate for spectrum in the auction or purchase service through a commercial service provider reflects a lack of understanding on the fundamental mission of these users. The Commission can partially address this failure by allocating the 2390-2400 MHz band paired with the 2300-2310 MHz for duplex private land mobile operations. This action will accommodate a portion of the need of this industry for advanced, effective wide area wireless communications services.

Also, Motorola believes that the most effective user of the 2402-2417 MHz band is a stable Part 15 spread spectrum industry which has already demonstrated its ability to thrive on competition through innovation. The Commission should not allocate this band to a generic mobile or fixed service and instead should assure the Part 15 community that their

development can continue without additional risk of being forced from the band by licensed services.

As a leading U.S. manufacturer of wireless communication systems for both fixed and mobile applications, Motorola is a leading advocate for increasing the pool of available spectrum for non-government applications. However, proper spectrum management is perhaps the key ingredient for ensuring that this scarce national resource is used to its greatest benefit. Motorola disagrees that this goal is achieved by generic allocations where the specific spectrum is determined on an ad hoc basis through an auction process. Such a process does little to ensure that the critical needs of users unable to pay exorbitant fees are satisfied.

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